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Greater Suttle Lake Vegetation Management Project Soils Report

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Background

The Greater Suttle Lake Vegetation Management Project includes campgrounds, day-use areas and organizational camps around Suttle, Dark and Tamarack Lakes on the Sisters Ranger District of the Deschutes National Forest. The areas proposed for treatments are Administratively Withdrawn under the Northwest Forest Plan (NWFP) and designated as Intensive Recreation Areas under the Deschutes National Forest Land and Resource Plan (LRMP). The project proposes to abate danger and hazard trees in these areas to protect public safety and reduce potential damage to recreation infrastructure. This report discusses the effects to the soil resource of felling and removing designated trees infected with dwarf mistletoe and stem and root rot diseases from these areas.

Affected Environment

The Suttle Lake project area is within a glaciated valley on the east slope of the Cascade Range. The lower valley includes Suttle Lake, Blue Lake, Dark Lake and Scout Lake, as well as Link Creek that flows between Blue and Suttle Lakes. Bedrock material consists predominately of Holocene (Qba) or Pleistocene (Qoba) aged basaltic andesites that are overlain by glacial till deposits (Qgs) of the Suttle Lake advance (Figure_1). Slopes within the project area range between 5 and 45%. Annual precipitation is approximately 40 inches between an elevation band of 3,490 and 3,750 feet.

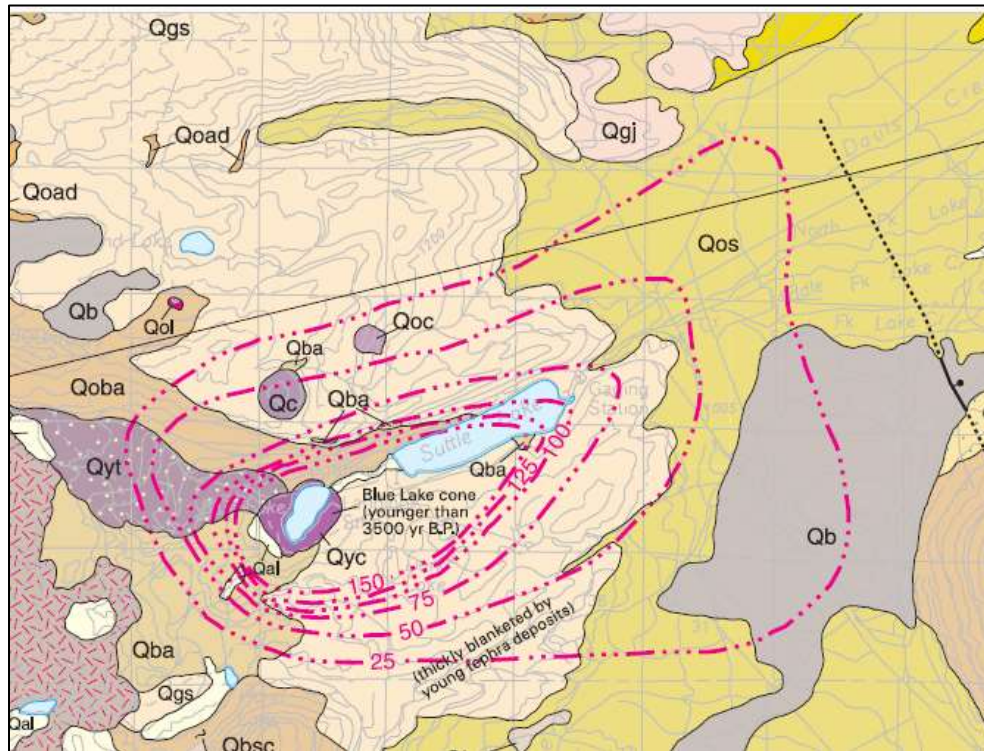
Surface soils in the project area consist primarily of a moderately deep to deep layer of Blue Lake cinders deposited approximately 1,300 years ago when Blue Lake was formed. These cinders are mapped as landtypes 33 and 34 in the Deschutes Soil Resource Inventory (SRI), differentiated only by slope gradients and aspects that influence moisture retention and availability on site. The surface cinders range from 40 to 50 inches in depth (Figure_1) and are underlain by a moderately deep layer of volcanic ash and a moderately deep layer of glacial till in both landtypes. Permeability is very rapid in the surface cinders and rapid to moderate in the subsurface ash and till layers.

The coarse cindery soils present in all proposed treatment areas are moderately resistant to compaction and moderately susceptible to displacement from machine traffic. These soils have high infiltration rates and rapid permeability of water in an uncompacted state. The finer textured ash in the subsurface is only slightly less permeable than the surface cinders while the subsurface till is less permeable at depth. The





lack of structural development in the surface cinders makes them moderately susceptible to erosion when water is channeled on compacted soil surfaces like skidroads, waterbar outlets, or road drainage structures and directed as overland flow. The single grained structure is also moderately susceptible to vibrational compaction mechanisms but readily receptive to subsoiling to reduce compaction that can result from repeated machine traffic.



Figure_1. Geologic and surficial features of the Suttle Lake area including depositional isobars of Blue Lake Cinders measured in centimeters.

A range of mixed conifer plant communities are present within the area that include Douglas-fir, white fir, ponderosa pine and white pine as major tree species. Understories support chinquapin, vine maple, snowbrush, currant, snowberry, traveling blackberry, Oregon grape, sedges and a number of forbs.





Management Direction

Deschutes National Forest Land and Resource Management Plan

The Deschutes Land and Resource Management Plan (LRMP) specifies that soil productivity potential be maintained or enhanced following land management activities. Forest-wide standards and guidelines ensure that soils are managed to provide sustained yields of managed vegetation without impairment of the productivity of the land (LRMP 1990). Some aspects of LRMP and Region 6 direction for minimizing detrimental soil disturbance levels within a project area will be followed to maintain soil productivity as much as possible within these areas. However, the LRMP acknowledges that “soil would be displaced as a result of the...construction of roads, trails, recreation, and geothermal facilities. Overall, soil productivity would be maintained except for sites dedicated to roads, landings, recreation sites, and other facilities or uses which compact the soil or occupy a site.” (Deschutes Forest Plan FEIS, page 2-126). As a result, a percentage of soils within lands managed for intensive recreation and administratively withdrawn from the Timber base are permanently dedicated to structures, roads, trails and other uses and may result in these areas not meeting standards and guidelines for productivity.

US Forest Service, Region 6, Soil Quality Standards and Guidelines

In addition to LRMP Standards and Guidelines, the Pacific Northwest Region developed Regional Soil Quality Standards and Guidelines that limit the amount of allowable detrimental soil disturbances associated with management activities (US Forest Service, 1998). This Regional guidance supplements LRMP Standards and Guidelines and is designed to further protect or maintain soil productivity.

FS R6 Soil Quality Standards and Guidelines

On August 24, 1998, the Regional Forester issued a Region 6 supplement to the 2520 Forest Service Manual (R-6 Supplement No. 2500.98.1). This supplement clarifies direction for planning and implementing activities in areas where soil standards are exceeded from prior activities:

2520.3 – Policy. Design and implement management practices which maintain or improve soil and water quality. Emphasize protection over restoration.

When initiating new activities:

- Design new activities that do not exceed detrimental soil conditions on more than 20 percent of an activity area. (This includes the permanent transportation system).
- In activity areas where less than 20 percent detrimental soil impacts exist from prior activities, the cumulative amount of detrimentally disturbed soil must not exceed the 20 percent limit following project implementation and restoration.





- In activity areas where more than 20 percent detrimental soil conditions exist from prior activities, the cumulative detrimental effects from project implementation and restoration must, at a minimum, not exceed the conditions prior to the planned activity and should move conditions toward a new improvement in soil quality.

Detrimental soil impacts are defined as those that meet the criteria described in the FS R6 Soil Quality Standards listed below:

- Detrimental soil compaction in volcanic ash/pumice soils is an increase in soil bulk density of 20 percent, or more, over the undisturbed level.
- Detrimental soil puddling occurs when the depth of ruts or imprints is six inches or more.
- Detrimental soil displacement is the removal of more than 50 percent of the A horizon from an area greater than 100 square feet, which is at least 5 feet in width.
- Severely burned soils are considered to be detrimentally disturbed when the mineral soil surface has been significantly changed in color, oxidized to a reddish color, and the next one half inch blackened from organic matter charring by heat conducted through the top layer.

The FS R6 Soil Quality Standards and Guidelines also provide policy for planning and implementing management practices that maintain or improve soil quality. This Regional guidance is consistent with interpretations for Deschutes LRMP Standards and Guidelines.

2521.03.3 - Application of Soil Quality Standards.

- a. Planning. Use soil quality standards to guide the selection and design of management practices and prescriptions on a watershed scale. Evaluate existing soil conditions on all ownerships within the watershed and consider cumulative effects with the addition of proposed actions on ecosystem sustainability and hydrologic function. On a planned activity area, evaluate existing soil conditions and design activities to meet soil quality standards. Document adjustments to management practices, soil conservation practices or restoration techniques necessary to meet threshold values for the affected soil properties and watershed conditions.*

Best Management Practices

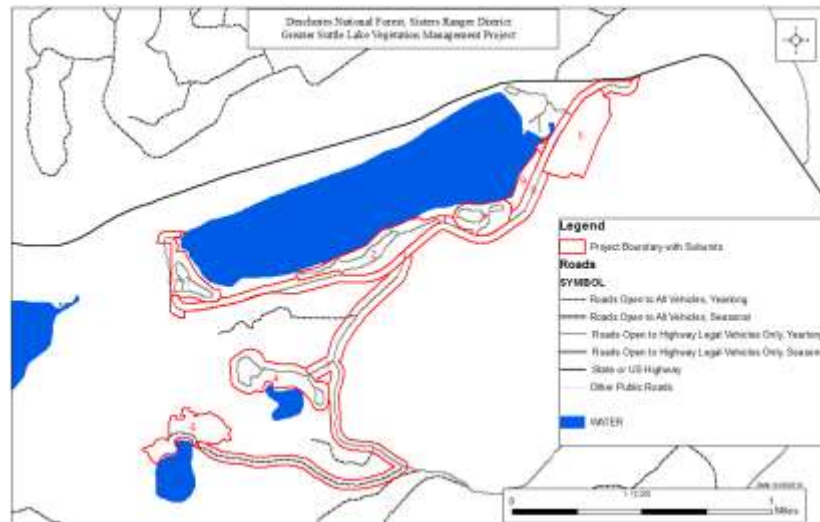
Best Management Practices (BMPs) as described in the National Core BMP Technical Guide (US Forest Service BMP, 2012) are applied along with other Project Design Criteria (PDC) to develop resource protection measures common to the action alternatives.





Treatment Units

Nine units are identified for treatment under this proposal (Figure_2). These include Developed Recreation Areas (four campgrounds and two organizational camps) and Roadside treatment areas between the developed areas.



Figure_2. Map of proposed treatment units

Proposed Actions analyzed in this report include the following:

- Units 1, 2, 3, 4, 5, 6 (Campground units, Methodist Camp and Camp Tamarack).
Fell and remove or leave on the ground:
 - all trees with a hazard tree rating of 7 or 8 in striking distance of a target (structure or area where people congregate for extended periods of time).
 - all DF with DMR of 5-6
 - all DF with DMR 4 and >10% top kill
 - all WF with DMR of 5-6
 - all WF with dead tops
 - all WF in Armillaria root rot centers and 50' beyond last visual sign of Armillaria
 - all WP with blister rust and extensive rot/decay
- Units 7 and 8 (Roadside Treatments): Commercial removal of White fir and Douglas fir with DMR of 5-6 within 150 feet of the road. This would include trees of all sizes with imminent or likely failure potential within striking distance of Forest Roads 2070, 2066 and 2066_600.
- Unit 9: Hand operations to Pre-commercial Thin (PCT) 110 trees per acre (TPA) residual and brush cut with leave preference of healthy Douglas-fir greater than 50' from a Douglas-fir with Dwarf Mistletoe brooms or a freshly cut DF stump; western white pine w/out blister rust; western larch; ponderosa pine; lodgepole pine; and grand fir.





- All units: Prune DF with DMR 1-4 by bucket truck, tree climbers, or with youth crews. Undesirable Tree Removal of all seedlings and saplings (1' tall to 8" DBH) of GF or DF 50' around each cut dwarf mistletoe stump (all units) and evaluate for planting of non-host species such as rust resistant WP, PP, and WL [50' radius = .18 acres].
- Burial of approximately 2,833 feet of powerlines into and around Camp Tamarack as a connected action.

Existing Condition

The analysis of effects to soils will refer to treatment units 1 through 9 as the individual analysis units.

- Treatment units 1 through 6 are campgrounds or organizational camps.
- Treatment units 7 and 8 are roadside hazard units.
- Treatment unit 9 is a PCT unit located between campgrounds.

Field reconnaissance, aerial photos and LiDAR interpretation were used to assess soil resource conditions within the treatment units. The aerial extent of the soil resource dedicated to structures, campsites, roads, gathering areas, play areas and trails in support of Intensive Recreation use and management is greater than 20% in treatment units 1 – 6. However, these areas are withdrawn from the Timber base of the Forest and may exceed the 20% threshold for the spatial extent of detrimental soil disturbance (Deschutes Forest Plan FEIS, page 2-126).

The majority of detrimental soil conditions within campground units 1, 2, 3 and 4 are on areas dedicated to campsites, parking areas, pathways and toilets. Although various entries have occurred over the years to remove hazard trees, most have been hand felled and removed on an individual or small number per entry basis with very little skidding involved. Trampling from foot traffic and tenting at the edges and between sites has also compacted and de-vegetated some areas not dedicated to the sites. However, most soil areas between dedicated infrastructure in these treatment areas are generally productive and support the growth of native vegetation.

Various entries have occurred within the organizational camp units 5 and 6 to treat hazard over the years. Old skid trails and landings are present in portions of each unit that were used during previous entries to remove trees both before and while the camps were operating. Some of these trails are still apparent on the ground and may be utilized during this entry. Evidence of these components are less apparent around the high-density cabin and lodge areas where the old infrastructure has become pathways and roads.

Treatment units 7, 8, and 9 have evidence of past entry to remove trees under general road maintenance treatments or following fire. However, old skid trails and access routes are not prevalent or obvious on the ground and detrimental soil disturbance levels are generally at or below 10% within these treatment units.





EFFECTS ANALYSIS

The effects analysis for the soils resource assumes the implementation of the project under the following Project Design Criteria (PDC) to reduce impacts to the Soil and Water resources:

Project Design Criteria

- Incorporate Best Management Practices (BMP) into the project design and/or implementation to minimize impacts to soil and water resources.
- Designate skid trails and landing locations before entry.
- Rehabilitate skid trail and landings throughout the project area by subsoiling or roughening the surface with machine implements, spreading displaced berms, covering with slash and planting with appropriate conifer species and understory shrubs.
- Minimize machine traffic to fell and bunch trees to four or fewer passes on upland plant communities within Zone 2 of the Riparian Reserves
- Limit machinery used to grapple pile in units 7 and 8 to skid trails and landings utilized for harvest and yarding operations. Do not operate ground-based equipment on slopes > 30%.
- Hand fall trees within treatment units 7 and 8 that are located on steep slopes where machinery cannot operate without excessive disturbance.
- Fully or partially suspend harvested material from areas of steep slope where machines cannot operate without excess disturbance.
- Contour skid trails located within RRs to the degree possible; smooth and scarify surface, cover with organic woody material and install water bars following use.
- Install water bars and place woody debris on skid trails located on slopes over 10%.
- Rehabilitate all temporary roads by blading back displaced soil, de-compacting the mineral soil surface, installing waterbars and placing woody debris on the surface.

No Action - Alternative 1

This alternative proposes no management actions that would affect the soil resource in the short term. As a result, soil resource conditions within all proposed treatment units would remain the same as described in the existing conditions section of this report. Levels of compaction and disturbance may continue to exceed standard and guidelines for soil productivity and detrimental soil disturbance within campground and camp areas dedicated as intensive recreation areas as allowed by the Deschutes LRMP (Deschutes Forest Plan FEIS, page 2-126).





Over time, there would be a modest recovery of disturbance levels in some areas as natural processes continued to accumulate organic matter on the surface and promoted the continued development of the mineral soil A horizon. The capability of the soil resource to support the growth of understory and overstory vegetation in areas not dedicated to infrastructure would continue on an upward trend over time. However, some areas would likely incur disturbance from the as needed felling and removal of hazard trees that would be required to maintain public safety as trees continued to grow large mistletoe brooms or die from root rot or other insect and disease agents on site. Most of these trees would be hand felled and cut into firewood on site and would not incur major soil disturbance.

The burial of powerlines within the Camp Tamarack area is a connected action being analyzed under this document. This action would occur under Alternative 1 resulting in some disturbance along road and utility corridors. This includes the burial of approximately 2,833 feet of powerlines currently hanging from trees in and around Camp Tamarack. Lines would be buried approximately 3 feet below ground along designated road corridors and approximately 2 feet below ground where they stubbed out to specific structures throughout the camp. This would result in the temporary disturbance of the soil resource during the trenching process before they were filled in, covered with organic material and seeded with native grasses and forbs. Much of the disturbance would occur on existing areas dedicated to roads, pathways and utility corridors. The soil resource would recover over time in areas not being utilized as roads or pathways after rehabilitation of the soil surface.

Alternative 2

Alternative 2 would directly affect the soil resource as a result of proposed ground-based mechanical harvest and yarding activities in eight units totaling 243 acres and hand thinning and piling in one unit totaling 6 acres (Table_1).

Direct effects would include the disturbance of mineral soil in the form of compaction and/or displacement from machine traffic during the harvesting, yarding and processing trees designated for removal. Detrimental compaction, defined as a 20% increase in bulk density for ashy soils, would occur on skid trails and landings where harvesters, yarders and processors passed over the same piece of ground multiple times. Off trail traffic by harvesters is not expected to detrimentally compact the soil where single out and back passes occurred, although displacement of surface organics and some compression of mineral soil is likely to occur.

The extent of detrimental disturbance within each treatment unit would be minimized by the use of BMPs and PDCs designed for the soil and water resources. These include limiting travel to designated routes or specific out and back passes off of trails to cut, process and/or yard material, as well as designating landing areas and skid trails where machines can travel. Large trees (> 24" dbh) and those located on slopes exceeding 30% would be directionally hand felled to minimize the extent to which machine traffic for harvest operations would need to travel to process and yard tree boles once they were on the ground. Although some trees may be whole tree yarded it is expected that many of the trees would be limbed and bucked to log lengths in place. Logs would then be shovel loaded or lined to roads and skid trails for forwarding or hot loading. Crown branches limbed on site would be loaded onto forwarders or dump trucks for transport to designated landings.

Table_1 Proposed Treatment Units and Acres





Unit	Description	Acres
1	Link Creek Campground, Boat Ramp and Day-Use	16
2	South Shore Campground and Boat Ramp	29
3	Blue Bay Campground and Boat Ramp	14
4	Scout Lake Campground and Day-Use	27
5	Suttle Lake United Methodist Camp	31
6	Camp Tamarack	19
7	Roadside FS Roads 2066 and 2066_600	55
8	Roadside FS Road 2070	52
9	Adjacent area	6
		249

The project is anticipated to designate approximately 30 landings averaging ½ acre in size or 100 by 100 feet to store logs and/or tree slash generated from harvest. The approximate average of one landing per eight acres of treated ground is needed due to the large volume of mistletoe brooms and branches on the trees being removed and equates to approximately 6% of the unit areas on average. Most landings would be located on ground disturbed during past logging operations, although some would be on newly disturbed areas or on areas that have re-vegetated since their previous use. Up to seven landings could be located within the Riparian Reserve boundary to process material in Units 2, 3, 5A and 8, most of which are located at least 200 feet away from the edge of Suttle Lake. PDCs are in place to rehabilitate all landings within the Riparian Reserve by mechanically de-compacting the surface, covering with organic matter and planting with native vegetation.

A maximum of 0.5 miles of temporary road would be constructed to access landings utilized for the proposed activities. Short sections of temporary roads would be needed in Units 2, 4, 5 and 8. All of the sections would be located on upland soils outside of Riparian Reserve boundaries. PDCs are in place to rehabilitate all temporary road surface by mechanically breaking up surface compaction, spreading organic slash on the surface and installing water bars to prevent overland flows from channeling down slope.

A parallel skid trail would be designated approximately 75 feet from the road in roadside treatment Units 7 and 8 from which a machine would operate to cut and/or yard trees within these units. Averaging 8 feet in width this would comprise approximately 5% of these units, with an additional 6% comprised of multiple landings for each. Limited disturbance would occur off of these areas where trees were felled and processed toward the road where needed due to excessive slopes. These treatment areas are not expected to incur enough detrimental disturbance to exceed the 20% standard.

Skid trails and landings would also be designated within the campground and camp areas included in Units 1-6. Old skid trails within the Methodist Camp and Camp Tamarack would be re-utilized for this entry and a large area of disturbance to the north of the horse arena would be utilized as a landing in the Camp Tamarack unit. Some new areas would be utilized as landings within or adjacent to the campgrounds and the camp areas but kept to an average size of ½ acre. PDCs are included to fully rehabilitate all skid trails and landings located within the Riparian Reserve and may be applied to those located outside the Riparian Reserve in the respective camp areas. As a result, the increase in detrimental





disturbance within the campground and camp areas is expected to be minimized and within allowances defined by the Forest Plan for areas managed for Intensive Recreation.

Slash piles in landings would be burned following the sufficient curing of the material. This would likely occur during the late fall, winter or early spring following completion of the harvest and yarding activities. The extended duration of elevated soil temperatures generated by the burning of large slash piles would have direct short term effects on the soil resource. Bacterial and fungal populations in the top ten inches of mineral soil would initially be reduced on site but have been shown to recolonize and expand in successive years following the burning. These sites can be expected to have altered productivity in the near term but capable of supporting vegetative growth of forbs, shrubs and grasses within a few years after the piles are burned.

The burning of slash piles generated from pre-commercial thinning in Unit 9 would have lesser effects on the soil resource. Hand piles would be smaller and more loosely piled compared to the landing piles and would burn quicker and generate less heat into the mineral soil. Bacterial and fungal populations would be less impacted and recover more quickly than under the landing piles. These piles would cover no more than 5% of the 6 acre unit area and are likely to support vegetative growth within the first couple years following burning. As a result, these areas would not be considered detrimentally disturbed.

Alternative 2 includes the burial of approximately 2,833 feet of powerlines currently hanging from trees in and around Camp Tamarack. Lines would be buried approximately 3 feet below ground along designated road corridors and approximately 2 feet below ground where they stubbed out to specific structures throughout the camp. This would result in the temporary disturbance of the soil resource during the trenching process before they were filled in, covered with organic material and seeded with native grasses and forbs. Much of the disturbance would occur on existing areas dedicated to roads, pathways and utility corridors. The soil resource would recover over time in areas not being utilized as roads or pathways after rehabilitation of the soil surface.

Cumulative Effects

The Suttle Lake Project would have limited cumulative effects to the soil resource. Detrimental disturbance incurred by this project additional to existing or foreseeable levels of disturbance would meet LRMP standards for soil disturbance or be excepted within areas managed as Intensive Recreation under the Forest Plan.

Past activities in the same project area such as the Suttle Lake Dam Fish Passage Improvement Project and the Suttle Lake Trail Improvement Project do not or minimally overlap with the units proposed for treatment. The future maintenance of existing recreation facilities around the lakes would incur minimal impacts to the soil resource beyond areas already dedicated to structures, roads and pathways. Current and future foreseeable activities that could occur within the area affected by the proposed project like the Link Creek stream restoration project and Phase 2 of the Suttle Lake Trail Improvement Project do not or minimally overlap treatment units proposed in this project and neither of these restoration projects would negatively impact the soil resource while helping to improve riparian conditions.

Proposed activities within treatment units 1 thru 6 would incur a variety of direct effects to the soil resource as a result of ground-based machine operations, mostly as a result of compaction. Although the





proposed activities could combine with the existing extent of the soil resource dedicated to infrastructure to incrementally increase the levels of soil disturbance in Units 1-6 above Forest Plan and Regional Guideline thresholds for maintaining soil productivity, they are excepted under the Deschutes Forest Plan as areas dedicated to recreational infrastructure (Deschutes Forest Plan FEIS, page 2-126). As a result, cumulative effects in Units 1-6 from activities proposed in the Suttle Lake Project would meet Management Direction for the soil resource.

Roadside treatments in units 7 and 8 do not overlap any other past or future foreseeable actions. Impacts incurred by the proposed activities in these units would not incrementally increase detrimental soil disturbance levels above the 20% LRMP and R6 standards and guidelines for the soil resource.

The burial of approximately 2,833 feet of powerlines within Camp Tamarack as a connected action would have some additional impacts to the soil resource in Unit 6. The majority of trenching would occur under or adjacent to existing road beds where the soil resource is already dedicated to infrastructure but new ground could be disturbed for lines heading to individual structures that did not follow existing pathways. The amount of new disturbance would be minimized through rehabilitation by seeding and placing organic material on the surface to stabilize the surface soil and provide productive conditions to support vegetative growth. As a result, a limited amount of additional soil area would be disturbed within Unit 6 and the incremental increase in detrimental disturbance when combined with that incurred by the harvest and yarding actions included in the proposed action is unlikely to exceed LRMP standards.

Effects Analysis Conclusion

Activities proposed as part of the Greater Suttle Lake Vegetation Management Project would have direct effects to the soil resource in the form of detrimental soil disturbance. However, detrimental soil levels are not expected to exceed LRMP productivity thresholds for the soil resource in Units 7 and 8. Detrimental soil levels may exceed the 20% threshold within Units 1-6 due to the aerial extent of infrastructure dedicated to roads, buildings, campsites and pathways but would be excepted from these thresholds as areas managed under Intensive Recreation if they were to occur.

References

USDA Forest Service, 1990. Deschutes National Forest Land Resource Management Plan, Deschutes National Forest, 198 p.

USDA Forest Service, 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl: Standards and Guidelines for Management of Habitat for Late Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl.





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